

# Bacteria bioburden assessment and *MRSA* colonization of workers and animals from a Portuguese swine production: A case report

Edna Ribeiro, Adriano Pereira, Carolina Vieira, Inês Paulos, Maria Marques,  
Tamara Swart & Ana Monteiro

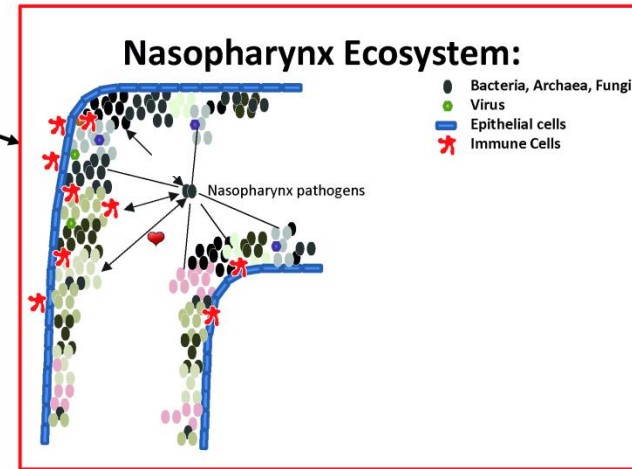
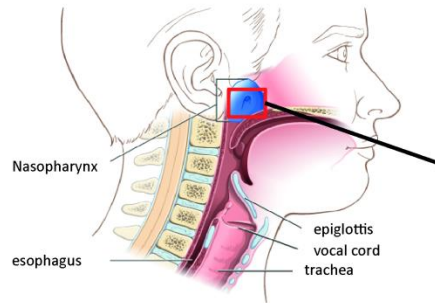
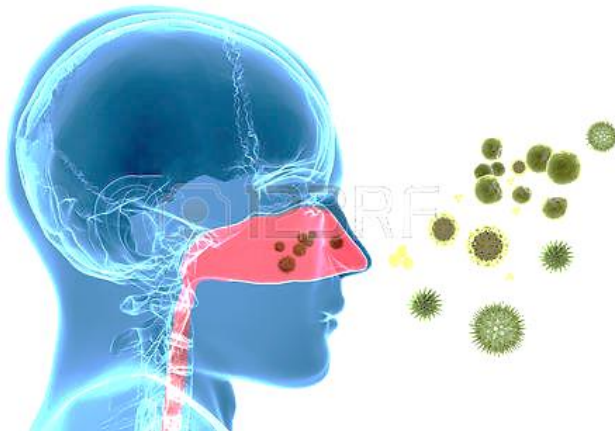
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Environment and Health Research Group, Escola Superior de Tecnologia da Saúde de Lisboa, ESTeSL, Instituto Politécnico de Lisboa, Av. D. João II, Lote 4.69.01, 1990-096 Lisboa, Portugal;  
Research Center LEAF - Linking Landscape, Environment, Agriculture and Food - Instituto Superior de Agronomia, Universidade de Lisboa, Portugal



## *Staphylococcus aureus*



### Nasal cavity and nasopharynx colonization



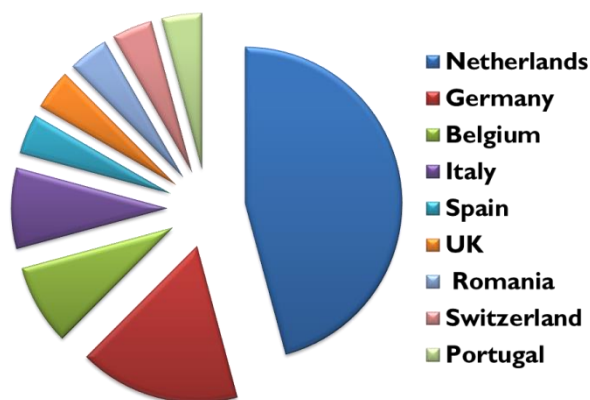
The primary portal of entry for inspired air, and therefore, the first region of the respiratory tract in contact with airborne bioburden



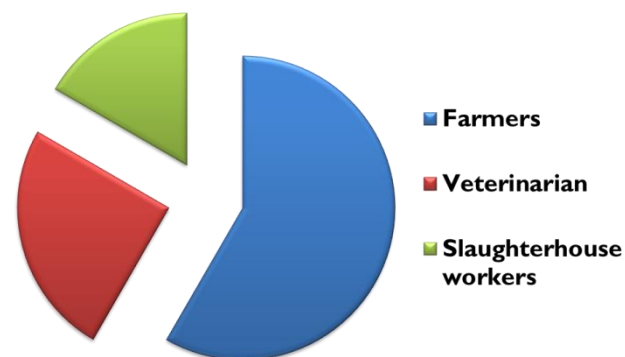
## Assessment of human exposure to *Staphylococcus aureus*

### LA-MRSA occupational colonization studies in Europe

European countries



Occupational exposed individuals



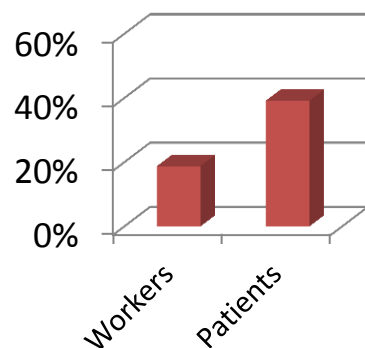
LA-MRSA occupational colonization has been mostly evaluated in Netherlands and Germany (11 and 4 studies respectively), in contrast to 2 or 1 studies performed in other EU countries.

The exceedingly higher colonization in farm workers (85%) followed by attending veterinaries (45%) and finally slaughterhouse workers 8% suggests that the direct contact with live animal carriers is the main route of exposure.

## Assessment of human exposure to *Staphylococcus aureus*

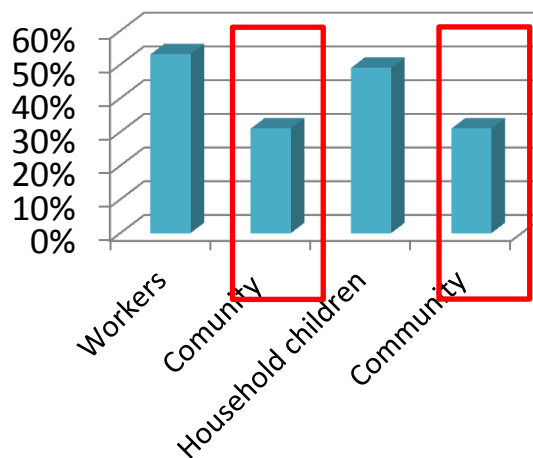
### Healthcare facilities

#### *Staphylococcus aureus*

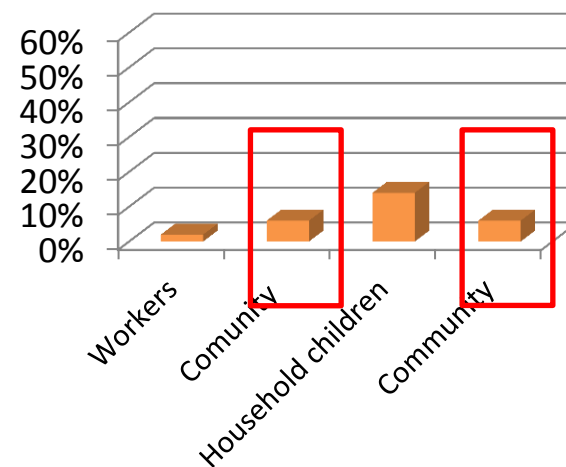


### Animal production

#### *Staphylococcus aureus*



#### Methicillin resistant *S.a.* (MRSA)



## Colonization of *S. aureus* sensible and resistant to methicillin in swinnery workers and animals

### MATERIALS AND METHODS

#### Nasopharynx swab

N=3 workers

N=15 swines



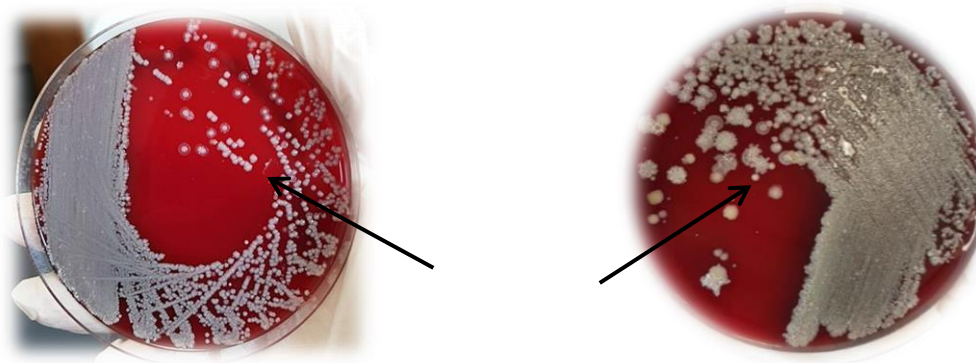
24 hours at 37°C



## Colonization of *S. aureus* sensible and resistant to methicillin in swinnery workers and animals

### MATERIALS AND METHODS

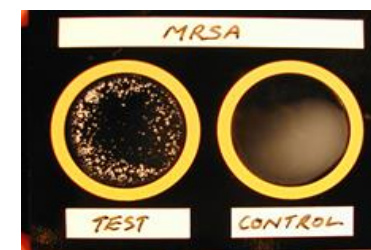
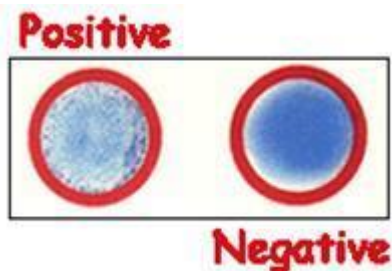
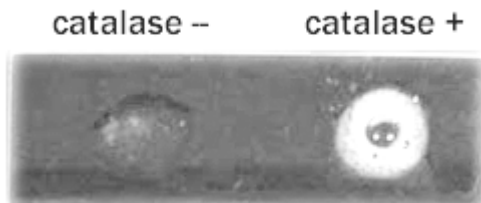
#### *Staphylococcus* identification



#### *Staphylococcus*

#### *S. aureus*

#### MRSA



## Colonization of *S. aureus* sensible and resistant to methicillin in swinnery workers

### RESULTS

Individuals	Swabs	<i>S.aureus</i> frequency analysis	MRSA frequency analysis
Workers	3	3 in 3 (100%)	3 in 3 (100%)
Piglets	15	15 in 15 (100%)	15 in 15 (100%)

Data reported concerning high colonization levels of MRSA, both in workers and in animals, as all analyzed individuals were carriers. These levels are exceedingly higher than levels detected in the community for *S.aureus* (31%) and for MRSA (2% - 3%)



## Environmental samples

### MATERIALS AND METHODS

**Air samples: N=5 (gestation, maternity, stalls, fattening and quarantine); N=1 outdoor**



Fig. 1 – Air samples: Millipore air Tester (Millipore) – impaction method



Fig. 2 – Incubate at 30°C and 35°C for 7 days (bacteria: (mesophilic bacteria and coliforms))

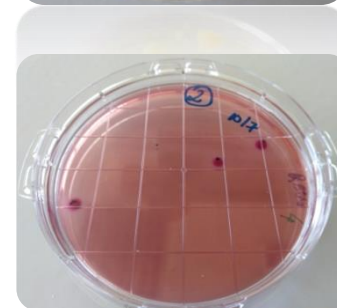


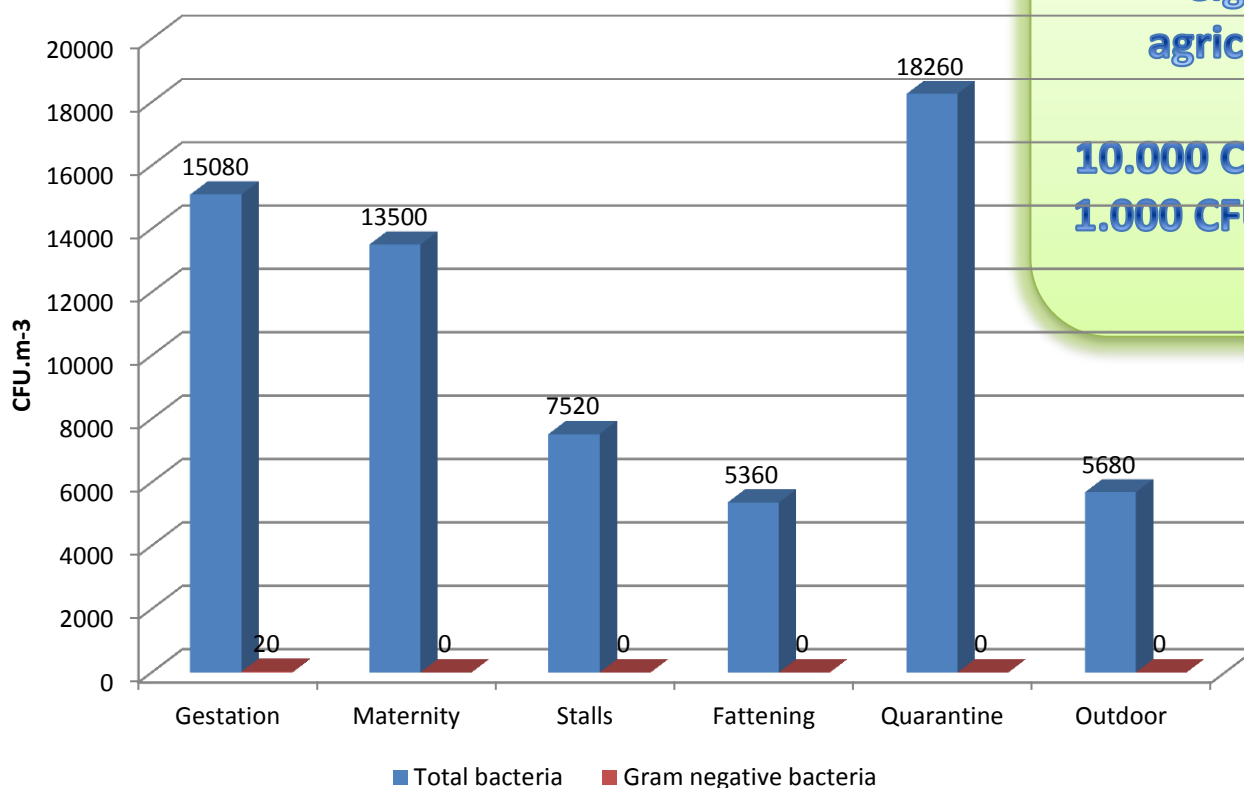
Fig. 3 - colony-forming units - CFU.m-3



## RESULTS

### Bacterial load obtained on air samples

#### Air Bacteria



Studies propose guidelines for  
eight hours of work in  
agricultural environments

10.000 CFU.m<sup>-3</sup> for total bacteria  
1.000 CFU.m<sup>-3</sup> for Gram-negative  
bacteria

Total air bacterial load ranged from 5360 CFU.m<sup>-3</sup> to 18260 CFU.m<sup>-3</sup> (median 11944 CFU.m<sup>-3</sup>)

## **Bacteria bioburden assessment and *MRSA* colonization of workers and animals from a Portuguese swine production: A case report**

Occupational exposure to LA-MRSA not only constitutes an important professional hazard but also constitute a relevant risk to individuals that came direct in contact with exposed workers, particularly children.

This work raise the awareness of the urgent need to monitor MRSA strains associated with animal carriers, occupational exposed individuals and potential sources of environmental contamination.

Valuable and effective efforts must be made to create occupational health surveillance programs and to determine and regulate the antibiotic selection pressure that is driving the emergence of these strains.





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